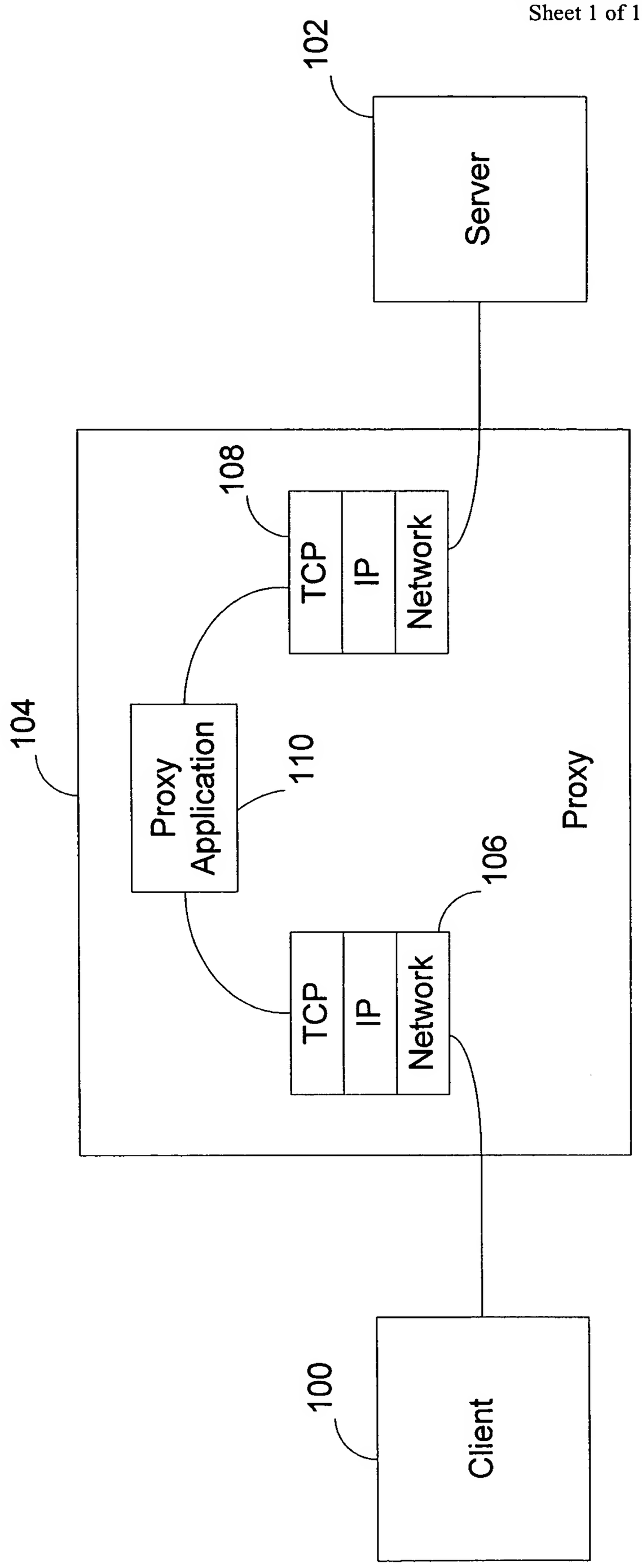

102
Server
104
Proxy
108
TCP
IP
Network
110
Proxy Application
106
TCP
IP
Network
100
Client

Fig. 1

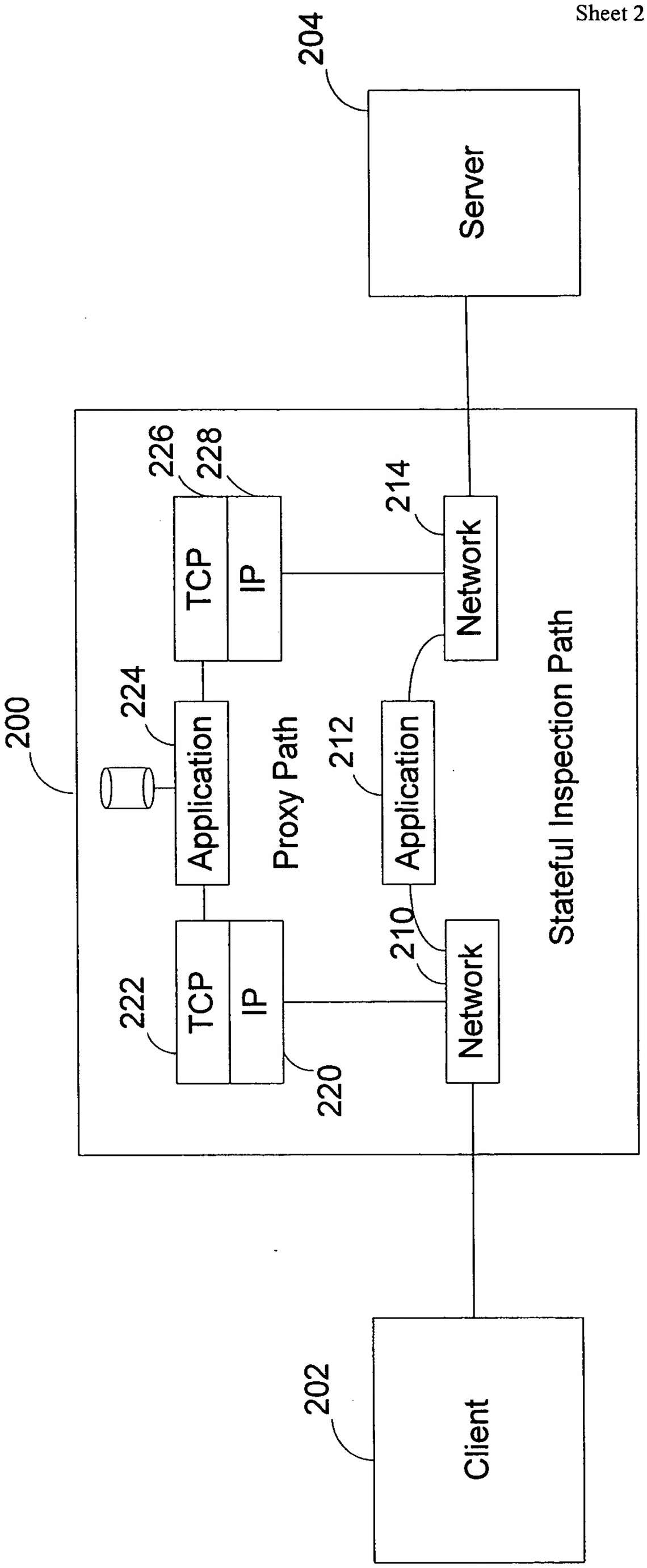

204
Server
226
228
214
TCP
IP
Network
200
224
Application
Proxy Path
212
Application
222
TCP
IP
210
Network
220
Stateful Inspection Path
202
Client

Fig. 2

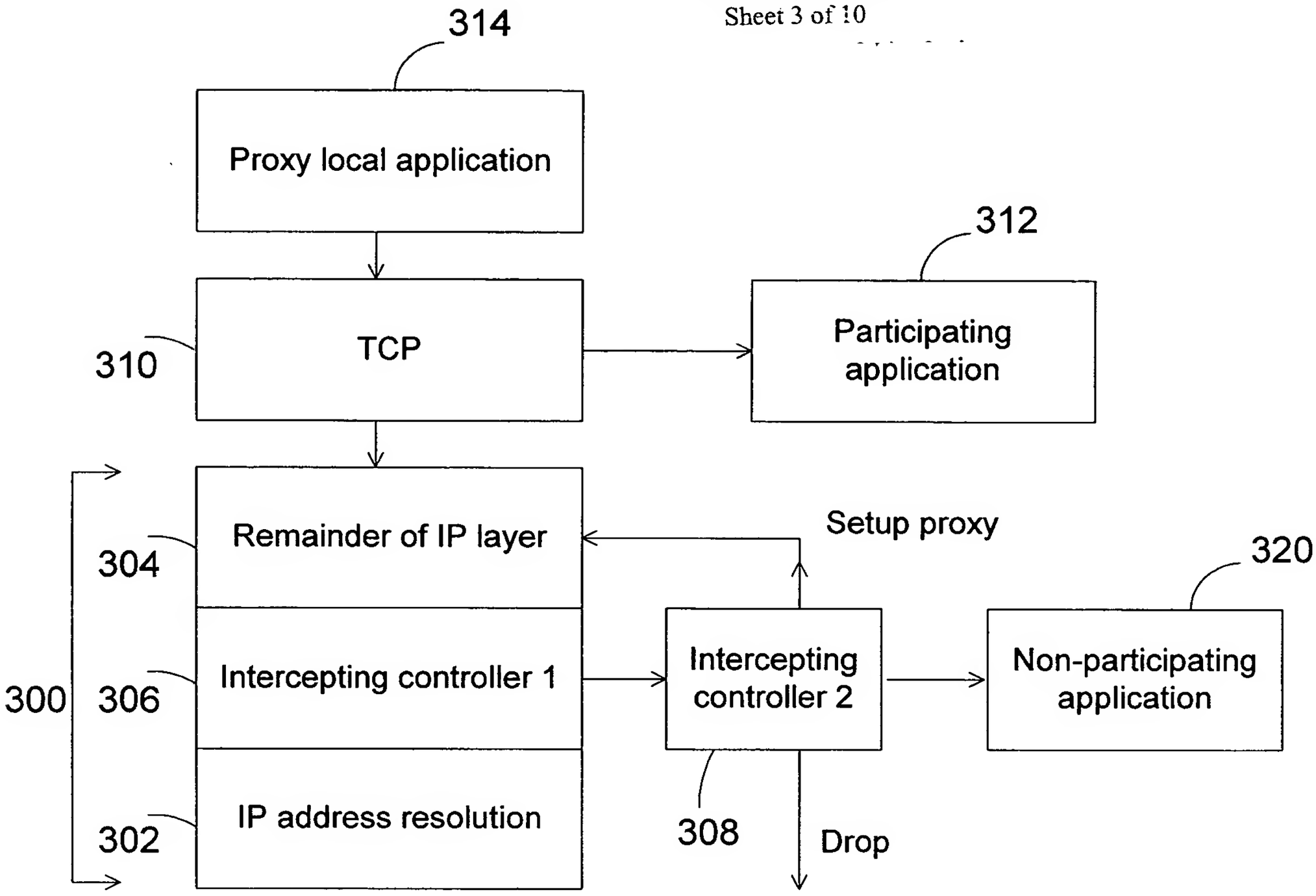

314
Proxy local application
312
310
TCP
Participating application
Remainder of IP layer
Setup proxy
320
304
Intercepting controller 1
Intercepting controller 2
Non-participating application
300
306
IP address resolution
308
Drop
302

Fig. 3

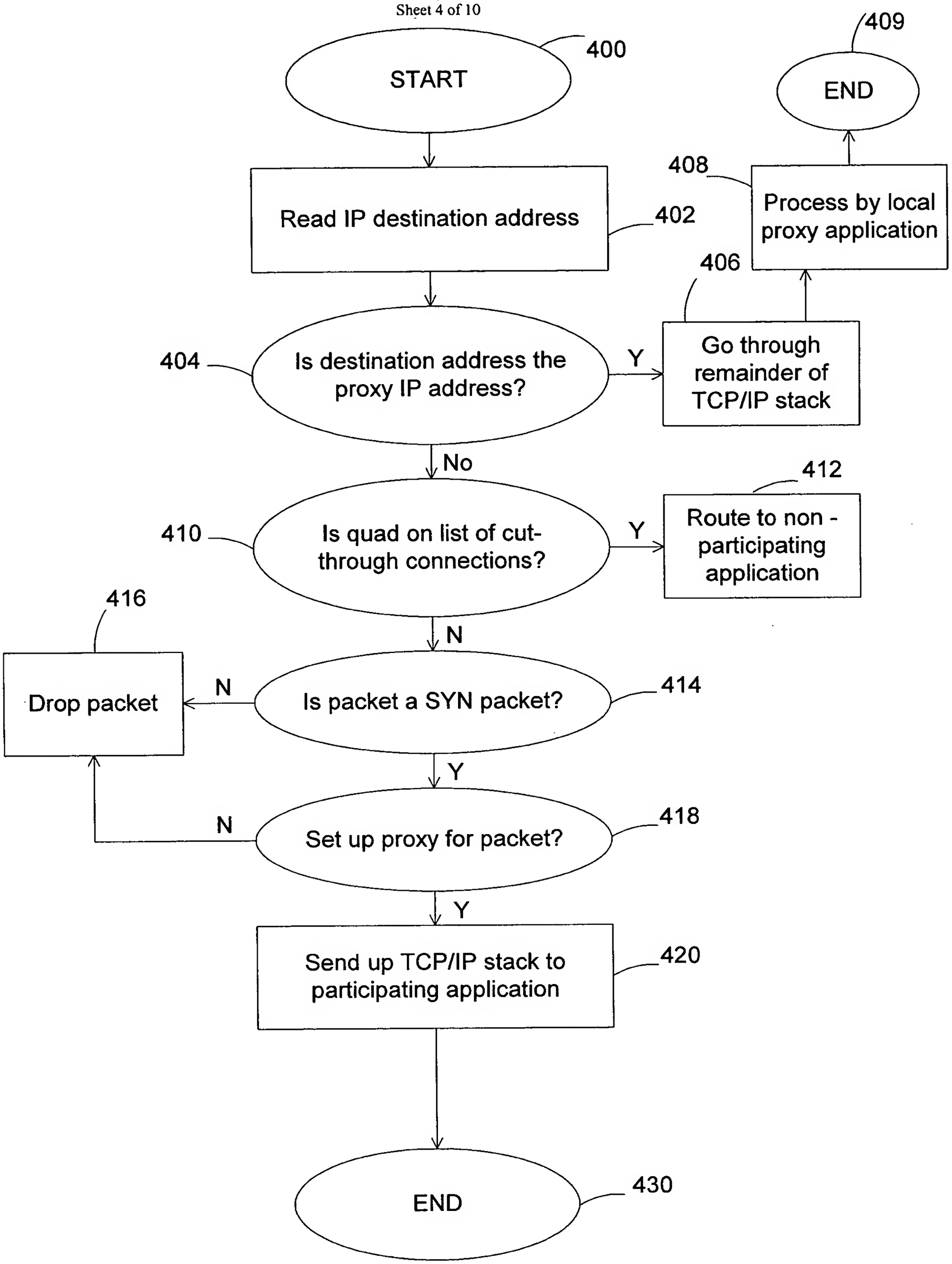

START
400
Read IP destination address
402
Is destination address the proxy IP address?
404
Y
Go through remainder of TCP/IP stack
406
Process by local proxy application
408
END
409
No
Is quad on list of cut-through connections?
410
Y
Route to non - participating application
412
N
Is packet a SYN packet?
414
N
Drop packet
416
Y
Set up proxy for packet?
418
N
Y
Send up TCP/IP stack to participating application
420
END
430

Fig. 4

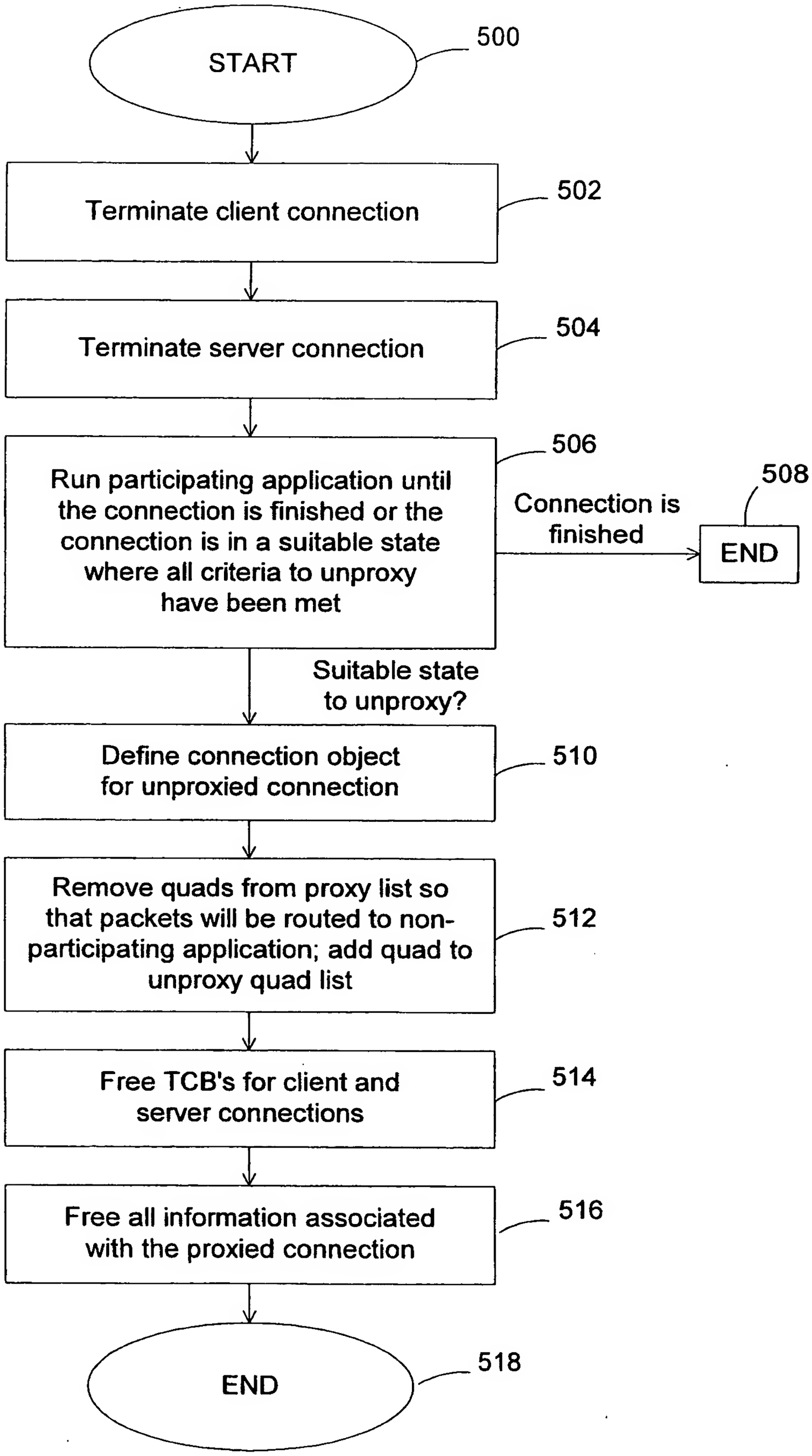

START
500
Terminate client connection
502
Terminate server connection
504
Run participating application until the connection is finished or the connection is in a suitable state where all criteria to unproxy have been met
506
Connection is finished
508
END
Suitable state to unproxy?
Define connection object for unproxied connection
510
Remove quads from proxy list so that packets will be routed to non-participating application; add quad to unproxy quad list
512
Free TCB's for client and server connections
514
Free all information associated with the proxied connection
516
END
518

Fig. 5

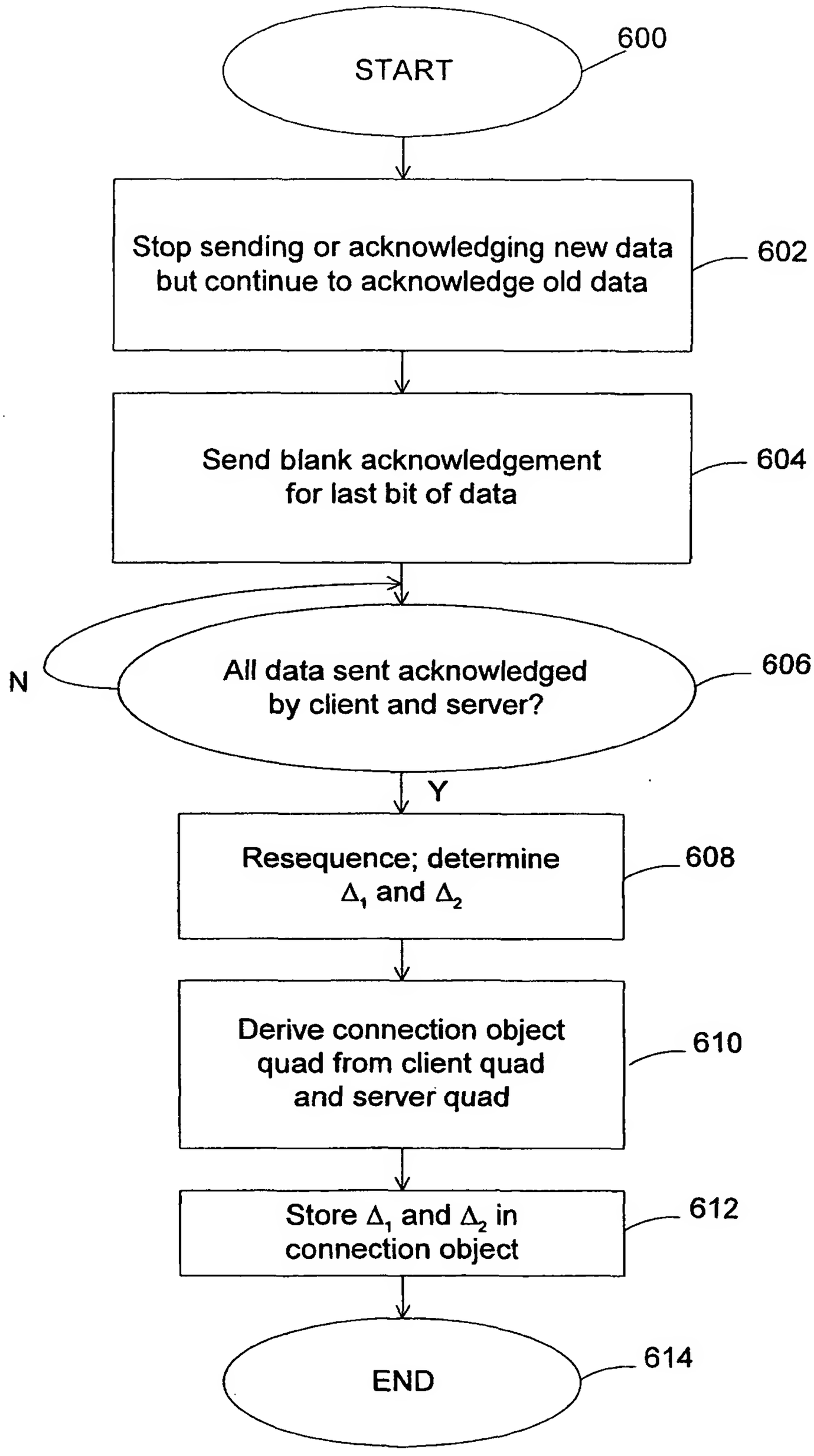

START
600
Stop sending or acknowledging new data but continue to acknowledge old data
602
Send blank acknowledgement for last bit of data
604
All data sent acknowledged by client and server?
606
N
Y
Resequence; determine Δ_1 and Δ_2
608
Derive connection object quad from client quad and server quad
610
Store Δ_1 and Δ_2 in connection object
612
END
614

Fig. 6

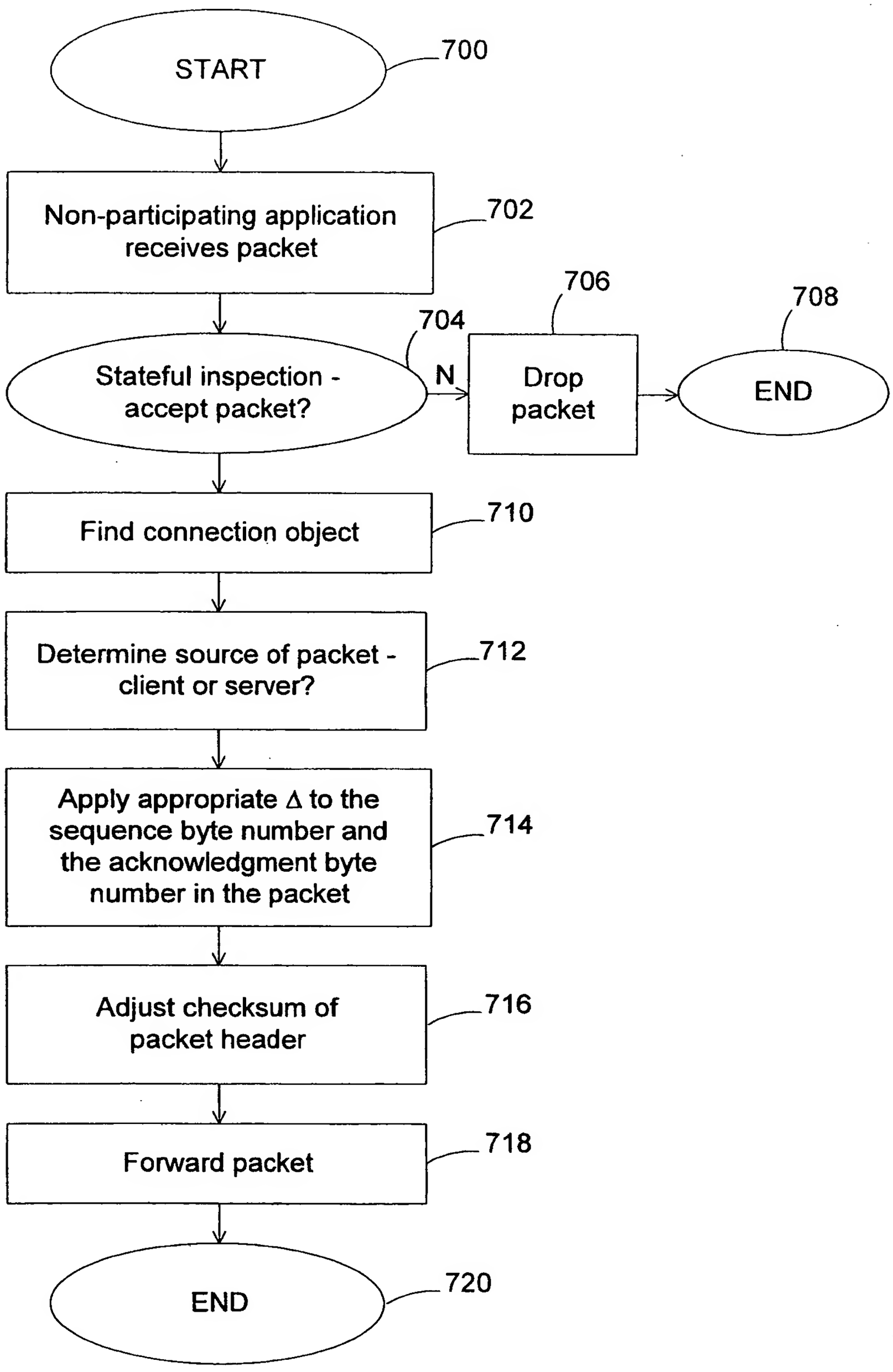
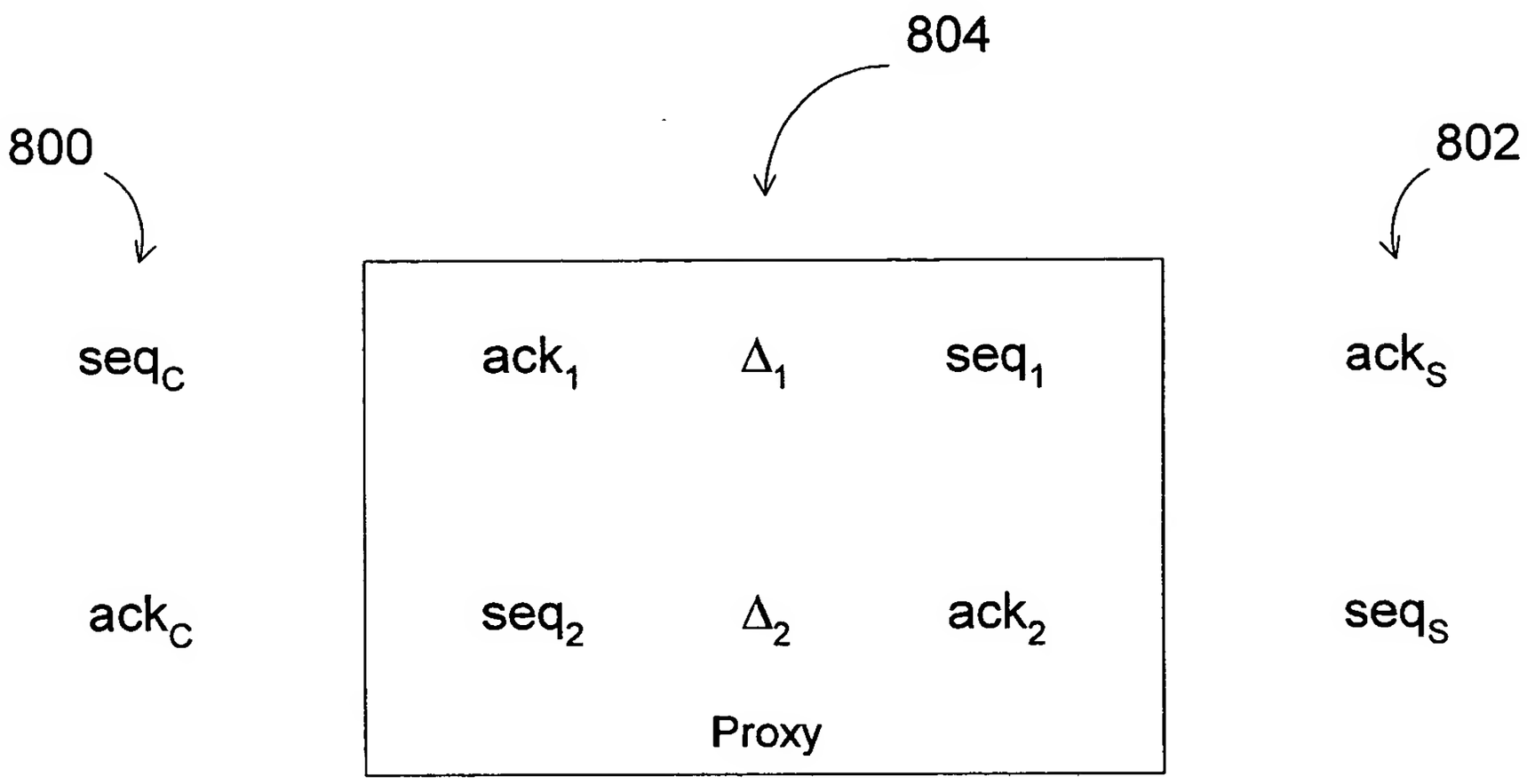

START
700
Non-participating application receives packet
702
Stateful inspection - accept packet?
704
N
Drop packet
706
END
708
Find connection object
710
Determine source of packet - client or server?
712
Apply appropriate Δ to the sequence byte number and the acknowledgment byte number in the packet
714
Adjust checksum of packet header
716
Forward packet
718
END
720

Fig. 7



$$\Delta_1 = seq_1 - ack_1 = ack_S - seq_C$$

$$\Delta_2 = seq_2 - ack_2 = ack_C - seq_S$$

Fig. 8

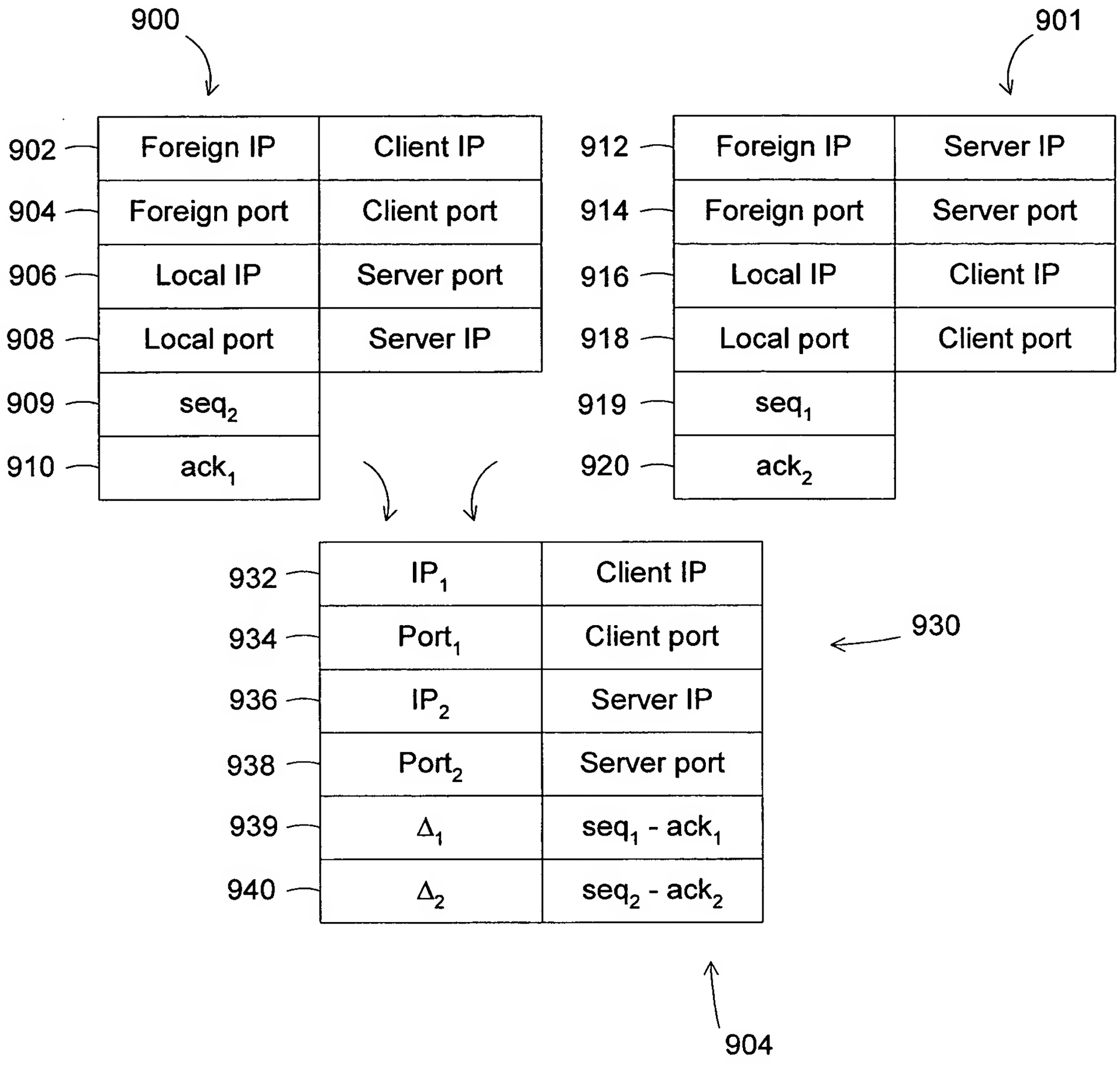

900
901
902
Foreign IP
Client IP
904
Foreign port
Client port
906
Local IP
Server port
908
Local port
Server IP
909
seq_2
910
ack_1
912
Foreign IP
Server IP
914
Foreign port
Server port
916
Local IP
Client IP
918
Local port
Client port
919
seq_1
920
ack_2
930
932
IP_1
Client IP
934
$Port_1$
Client port
936
IP_2
Server IP
938
$Port_2$
Server port
939
Δ_1
$seq_1 - ack_1$
940
Δ_2
$seq_2 - ack_2$
904

Fig. 9

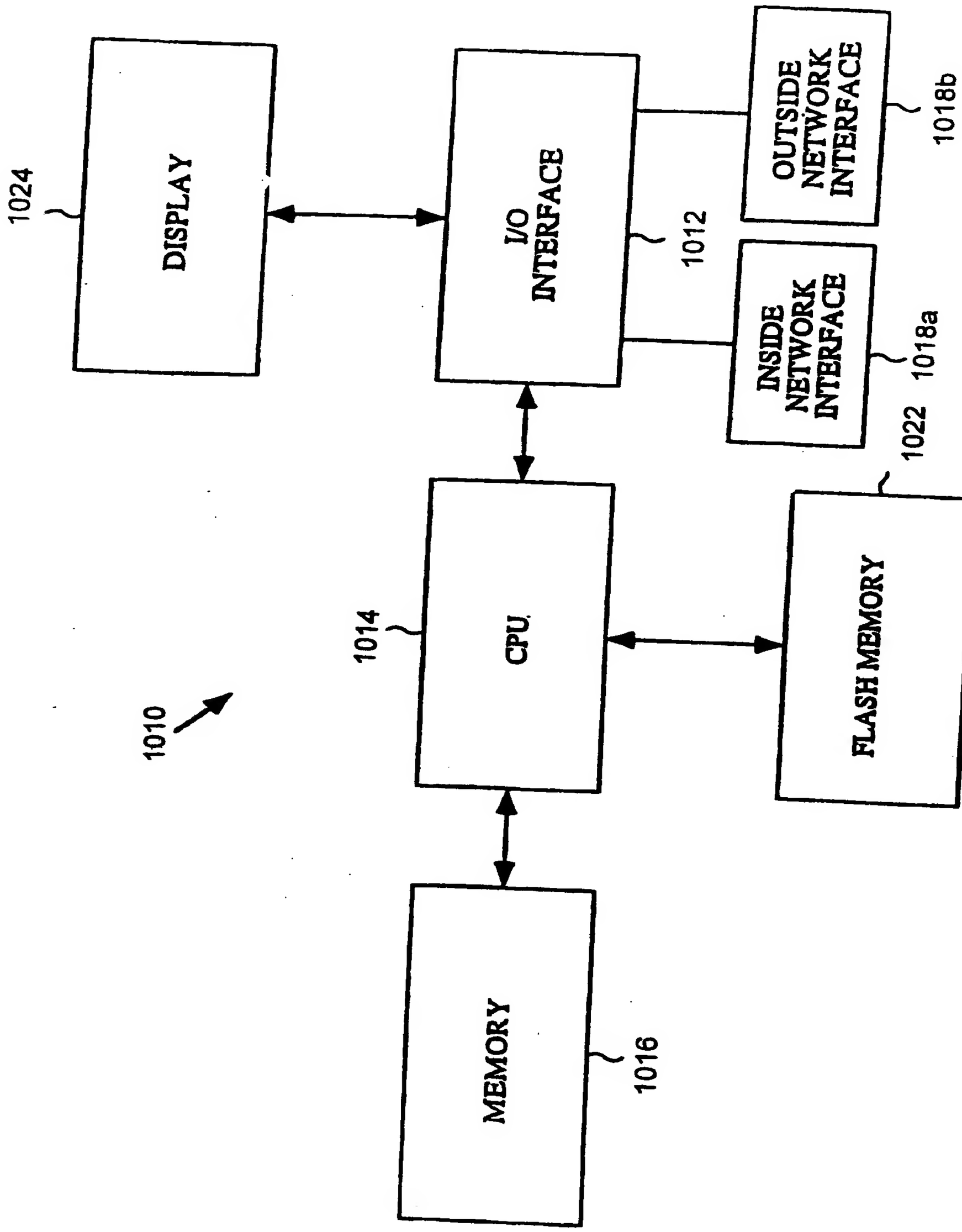

1010
1024
DISPLAY
I/O INTERFACE
1012
OUTSIDE NETWORK INTERFACE
1018b
INSIDE NETWORK INTERFACE
1018a
1022
1014
CPU
FLASH MEMORY
MEMORY
1016

Fig. 10